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In re Application of: Donald W. Verser et al.	§	Group Art Unit: 1764
Serial No.: 10/700,006	§	Examiner: Doroshenk, Alexa A.
Filed: November 3, 2003	§	
For: PROCESS AND APPARATUS FOR SEPARATING POLYMER SOLIDS, HYDROCARBON FLUIDS, AND PURGE GAS	§	Atty. Docket: CPCM:0019/FLE/ 210331US00

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August 21, 2006 — Marcie Alsbury
Date — Marcie Alsbury

APPEAL BRIEF PURSUANT TO 37 C.F.R. §§ 41.31 AND 41.37

This Appeal Brief is being filed in furtherance to the Notice of Appeal mailed on June 15, 2006, and received by the Patent Office on June 19, 2006.

The Commissioner is authorized to charge the requisite fee of $500.00, and any additional fees that may be necessary to advance prosecution of the present application, to the credit card listed on the attached PTO-2038. However, if the PTO-2038 is missing, if the amount listed thereon is insufficient, or if the amount is unable to be charged to the credit card for any other reason, the Commissioner is authorized to charge Deposit Account No. 06-1315, Order No.CPCM:0019/FLE (210331US00).

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1. **REAL PARTY IN INTEREST**

The real party in interest is Chevron Phillips Chemical Company, LP, the Assignee of the above-referenced application by virtue of the Assignment to Chevron Phillips Chemical Company, LP, recorded at reel 015102, frame 0211, and dated March 15, 2004. Accordingly, Chevron Phillips Chemical Company, LP will be directly affected by the Board's decision in the pending appeal.

2. **RELATED APPEALS AND INTERFERENCES**

Appellants are unaware of any other appeals or interferences related to this Appeal. The undersigned is Appellants' legal representative in this Appeal.

3. **STATUS OF CLAIMS**

Claims 1-3, 5-17, 20-22, 24, 25, 27-36, 39-41, and 43-51 are currently under final rejection and, thus, are the subject of this Appeal.

4. **STATUS OF AMENDMENTS**

All amendments in relation to the claims of the present patent application have been entered, and no amendments have been submitted or entered subsequent to the Final Office Action mailed on March 15, 2006.

5. **SUMMARY OF CLAIMED SUBJECT MATTER**

The present invention relates generally to the field of slurry polymerization, particularly to the separation of polymer solids, hydrocarbon fluids, and purge gas produced in or used for slurry polymerization and polymer recovery. Application, page 1, ¶ 2. The present application contains five independent claims, namely, claims 1, 15, 25, 36 and 46, all of which are the subject of this Appeal. The subject matter of these claims is summarized below.

Claim 1 relates to a process for slurry polymerization and for separating hydrocarbon fluid (e.g., ethylene, isobutane) from solid polymer particles (e.g., polyethylene, polypropylene) and purge gas (e.g., nitrogen). *See* Application, paras. 21-23. In a reaction zone (e.g., loop reactor 14), at least one olefin monomer (e.g., ethylene, 1-hexene, propylene) is polymerized to produce a slurry comprising solid polymer particles and hydrocarbon fluid. *See* Application, paras. 21-23, 29, and 31; Figure 1. A portion of the slurry is withdrawn (e.g., via continuous take-offs 52) from the reaction zone and sent to an intermediate pressure zone (e.g., flash gas separator 18) where hydrocarbon fluid (e.g., ethylene, isobutane) is separated from the solid polymer particles (e.g., polyethylene) as a vaporized hydrocarbon fluid stream e.g., via stream 56). *See* Application, paras. 21-23, 29, 31, 34-35, and 37; Figure 1. This vaporized hydrocarbon fluid stream is condensed in a condensing zone (e.g., condenser 29), whereby a condensed hydrocarbon fluid stream is formed and then transferred to a recycle zone (e.g., recycle tank 30). *See id* at paras. 42-43; Figure 1. At least a majority of the condensed hydrocarbon fluid in the recycle zone is

passed to the reaction zone without fractionating the condensed hydrocarbon fluid. *See id.* at para. 43; Figure 1.

The solid polymer particles (e.g., polyethylene, polypropylene) are transferred from the intermediate pressure zone (e.g., flash gas separator 18) to a purge zone (e.g., purge column 24) in which a purge gas (e.g., nitrogen via nitrogen return line 60) is passed through the solid polymer particles to remove entrained hydrocarbon fluid, thereby forming a mixed stream containing hydrocarbon vapor and purge gas. *See id.* at para. 41; Figure 1. This mixed stream is transferred to a recovery zone (e.g., INRU 28) where the purge gas and hydrocarbon fluid are separated to form a recovered purge gas stream (e.g., via return line 60) and a recovered hydrocarbon fluid stream (e.g., via path 53). *See id.* A first portion of the recovered purge gas stream (e.g., via return line 60) is passed from the recovery zone to the purge zone. *See id.* A first portion (e.g., via path 55) of the recovered hydrocarbon fluid stream is passed from the recovery zone to a fractionation zone. *See id.*

Claim 15 relates to an apparatus for slurry polymerization in a hydrocarbon fluid (e.g., ethylene, isobutane) and for separating hydrocarbon fluid from solid polymer particles (e.g., polyethylene, polypropylene) and purge gas (e.g., nitrogen), the apparatus including: (a) a polymerization reactor (e.g., loop reactor 14) in which one or more olefins (e.g., ethylene, propylene) are polymerized to form solid polymer particles in a hydrocarbon fluid(e.g., ethylene, isobutane); (b) an intermediate pressure chamber (e.g., flash gas separator 18) adapted for the separation of hydrocarbon fluid from the solid polymer

particles, the chamber having an inlet (e.g., via flashlines 20, 54) for receiving hydrocarbon fluid and solid polymer particles from the polymerization reactor, a polymer outlet (via fluff chamber 22) for discharging solid polymer particles, and a gas outlet (e.g., via stream 56) for discharging vaporized hydrocarbon fluid; (c) a condenser (e.g., condenser 29) fluidically connected to the gas outlet of the intermediate pressure chamber and adapted to condense the vaporized hydrocarbon fluid by heat exchange and without compression; (d) a purge column (e.g., purge column 24) fluidically connected to the polymer outlet of the intermediate pressure chamber, the purge column adapted to receive the solid polymer particles from the intermediate pressure chamber; and (e) a hydrocarbon/purge gas recovery unit (e.g., INRU 28) adapted to separate hydrocarbon fluid from purge gas, the recovery unit fluidically connected to a top portion of the purge column and adapted to receive a fluid stream comprising purge gas and hydrocarbon fluid from the purge column. *See* Application, paras. 21-23, 29, 31, 34-35, and 37; Figure 1.

The apparatus of claim 15 further includes: (f) a recycle tank (e.g., recycle tank 30) adapted to receive condensed hydrocarbon vapor from the condenser; (g) a pump (e.g., pump at bottom of recycle tank 30) and at least one conduit (see Figure 1) fluidically connected to a bottom portion of the recycle tank, wherein the pump and the at least one conduit are adapted to transport the condensed hydrocarbon fluid from the recycle tank to the reactor without transporting the condensed hydrocarbon fluid through a fractionation system; (h) a vapor delivery conduit (e.g., at valve 31) coupled to a top portion of the recycle tank and fluidically connected to a first fractionation column; and (i) an extruder

feed tank (e.g., tank 325) adapted to receive the solid polymer particles from the purge column. *See* Application, paras. 42 and 43; Figures 1 and 3.

Claim 25 relates to a process for slurry polymerization and for separating hydrocarbon fluid (e.g., ethylene, propylene, 1-hexene, isobutane) from solid polymer particles (e.g., polyethylene, polypropylene) and purge gas (e.g., nitrogen), the process including: polymerizing in a reaction zone (e.g., loop reactor 14) at least one olefin monomer (e.g., ethylene, propylene) to produce a slurry, having solid polymer particles and hydrocarbon fluid; withdrawing a portion of the slurry from the reaction zone; separating at least a majority of the hydrocarbon fluid from the solid polymer particles in an intermediate pressure zone (e.g., flash separator 28) as a vaporized hydrocarbon fluid stream; condensing the vaporized hydrocarbon fluid stream in a condensing zone (e.g., condenser 29) , whereby a condensed hydrocarbon fluid stream is formed; transferring the condensed hydrocarbon fluid stream from the condensing zone to a recycle zone (e.g., recycle tank 30); and transferring the solid polymer particles from the intermediate pressure zone to a purge zone (e.g., purge column 24) in which a purge gas is passed through the solid polymer particles to remove entrained hydrocarbon fluid, thereby forming a mixed stream containing hydrocarbon vapor and purge gas. *See* Application, paras. 21-23, 29, 31, 34-35, and 37; Figure 1.

The process of claim 25 further includes: transferring the mixed stream to a recovery zone (e.g., INRU 28) where the purge gas and hydrocarbon fluid are separated to form a recovered purge gas stream and a recovered hydrocarbon fluid stream; passing at least a portion of the recovered purge gas stream from the recovery zone to the purge zone; passing at least a portion of the recovered hydrocarbon fluid stream from the recovery zone to the recycle zone; transferring vapor from the recycle zone to a fractionation zone (e.g., via conduit 262 to column 232); and transferring hydrocarbon liquid from the recycle zone to the reaction zone without fractionating the hydrocarbon liquid. *See* Application, paras. 21-23 and 42-43; Figures 1-3.

Claim 36 relates to an apparatus for slurry polymerization in a hydrocarbon fluid (e.g., ethylene, propylene, 1-hexene, isobutane) and for separating hydrocarbon fluid from solid polymer particles (e.g., polyethylene, polypropylene) and purge gas (e.g., nitrogen), the apparatus including: (a) a polymerization reactor (e.g., loop reactor 14) in which one or more olefins (e.g., ethylene, propylene) are polymerized to form solid polymer particles in a hydrocarbon fluid; (b) an intermediate pressure chamber (e.g., flash separator 28) adapted to separate hydrocarbon fluid from the solid polymer particles, the chamber having an inlet for receiving hydrocarbon fluid and solid polymer particles from the polymerization reactor, a polymer outlet for discharging solid polymer particles, and a gas outlet for discharging vaporized hydrocarbon fluid; (c) a condenser (e.g., condenser 29) fluidly connected to the gas outlet of the intermediate pressure chamber, the condenser adapted to condense the vaporized hydrocarbon fluid by heat exchange and without compression; (d) a purge column

(e.g., purge column 24) fluidly connected to the polymer outlet of the intermediate pressure chamber and adapted to receive the solid polymer particles from the intermediate pressure chamber; (e) a hydrocarbon/purge gas recovery unit (e.g., INRU 28) adapted to separate hydrocarbon fluid from purge gas, wherein the recovery unit is fluidically connected to a top portion of the purge column and adapted to receive a fluid stream comprising purge gas and hydrocarbon fluid from the purge column. *See* Application, paras. 21-23, 29, 31, 34-35, and 37; Figure 1.

The apparatus of claim 36 further includes: (f) a recycle tank (e.g., recycle tank 30) adapted to receive hydrocarbon liquid from the condenser to receive hydrocarbon fluid from the hydrocarbon/purge gas recovery unit; (g) a liquid delivery conduit (e.g., conduit 46) fluidically connecting a bottom portion of the recycle tank with the polymerization reactor, wherein the fluidic connection between the recycle tank and the reactor does not include a fractionation column; and (h) a vapor delivery conduit (e.g., conduit 262) fluidically connecting a top portion of the recycle tank with a first fractionation column (e.g., column 232). *See* Application, paras. 21-23 and 42-43; Figures 1-3.

Claim 46 relates to a method of processing effluent of a polymerization reactor (e.g., loop reactor 14), the effluent (e.g., via continuous take-offs 52) comprising hydrocarbon liquid and polymer solids (e.g., polyethylene, polypropylene), the method including: separating a majority of the hydrocarbon liquid from the polymer solids in the effluent by flashing the majority of the hydrocarbon liquid (e.g., in flash separator 28) to generate a

hydrocarbon vapor; transporting and condensing (e.g., in condenser 29) the hydrocarbon vapor to form a recovered hydrocarbon liquid (e.g., in the recycle tank 30); transporting an equilibrium vapor of the recovered hydrocarbon liquid (e.g., from the recycle tank 30) to a fractionation system (e.g., columns 232 and 234); and recycling at least a portion of the recovered hydrocarbon liquid to the polymerization reactor without fractionating the recovered hydrocarbon liquid. *See* Application, paras. 21-23, 29, 31, 34-35, 37, and 42-43; Figures 1-3.

6. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

First Ground of Rejection for Review on Appeal:

Appellants respectfully urge the Board to review and reverse the Examiner's first ground of rejection in which the Examiner rejected claims 3 and 28 under 35 U.S.C. § 112, second paragraph, as being indefinite.

Second Ground of Rejection for Review on Appeal:

Appellants respectfully urge the Board to review and reverse the Examiner's second ground of rejection in which the Examiner rejected claims 1, 2, 5, and 9-14 under 35 U.S.C. § 103(a) as being unpatentable over Hanson (5,597,892) in view of Kniel (3,696,162) and Howard et al. (5,533,437).

Third Ground of Rejection for Review on Appeal:

Appellants respectfully urge the Board to review and reverse the Examiner's third ground of rejection in which the Examiner rejected claims 3 and 44 under 35 U.S.C. § 103(a) as being unpatentable over Hanson (5,597,892) in view of Kniel (3,696,162) and Howard et al. (5,533,437) and Howard et al. (5,533,437), and further in view of Perry (3,869,807).

Fourth Ground of Rejection for Review on Appeal:

Appellants respectfully urge the Board to review and reverse the Examiner's fourth ground of rejection in which the Examiner rejected claims 6 and 7 under 35 U.S.C. § 103(a) as being unpatentable over Hanson (5,597,892) in view of Kniel (3,696,162) and Howard et al. (5,533,437) and Howard et al. (5,533,437), and further in view of Kreischer et al. (6,045,661).

Fifth Ground of Rejection for Review on Appeal:

Appellants respectfully urge the Board to review and reverse the Examiner's fifth ground of rejection in which the Examiner rejected claims 15-17, 20-22, 24 and 45 under 35 U.S.C. § 103(a) as being unpatentable over Hanson (5,597,892) in view of Kreischer et al. (6,045,661), Howard et al. (5,533,437), and Perry (3,869,807).

Sixth Ground of Rejection for Review on Appeal:

Appellants respectfully urge the Board to review and reverse the Examiner's sixth ground of rejection in which the Examiner rejected claims 25, 27, 29-36, 39, 41, 43, 46, 47 and 49-51 under 35 U.S.C. § 103(a) as being unpatentable over Hanson (5,597,892) in view of Kreischer et al. (6,045,661), and Howard et al. (5,533,437).

Seventh Ground of Rejection for Review on Appeal:

Appellants respectfully urge the Board to review and reverse the Examiner's seventh ground of rejection in which the Examiner rejected claims 28, 40 and 48 under 35 U.S.C. 103(a) as being unpatentable over Hanson (5,597,892) in view of Kreischer et al. (6,045,661), and Howard et al. (5,533,437), and Perry (3,869,807), as applied to claims 27, 39, and 46, and further in view of Kufeld et al. (6,559,247).

Eighth Ground of Rejection for Review on Appeal:

Appellants respectfully urge the Board to review and reverse the Examiner's eighth ground of rejection in which the Examiner rejected claim 21 under 35 U.S.C. 103(a) as being unpatentable over Hanson (5,597,892) in view of Kreischer et al. (6,045,661), Howard et al. (5,533,437), and as applied to claim 15, and further in view of Kufeld et al. (6,559,247).

Ninth Ground of Rejection for Review on Appeal:

Appellants respectfully urge the Board to review and reverse the Examiner's ninth ground of rejection in which the Examiner rejected claim 8 under 35 U.S.C. 103(a) as being unpatentable over over Hanson (5,597,892) in view of Kniel (3,696,162) and Howard et al. (5,533,437) and Howard et al. (5,533,437), and Kreischer et al. (6,045,661), as applied to claim 7, further in view of Kufeld et al. (6,559,247).

7. ARGUMENT

As discussed in detail below, the Examiner has improperly rejected the pending claims. Further, the Examiner has misapplied long-standing and binding legal precedents and principles in rejecting the claims under Sections 112 and 103. Accordingly, Appellants respectfully request full and favorable consideration by the Board, as Appellants strongly believe that claims 1-3, 5-17, 20-22, 24, 25, 27-36, 39-41, and 43-51 are currently in condition for allowance.

First Ground of Rejection – 35 U.S.C. § 112, Second Paragraph

In the Final Office Action, the Examiner rejected claims 3 and 28 under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Appellants respectfully traverse these rejections.

Claim 3

The Examiner asserted that claim 3 is "incomplete for omitting essential structural cooperative relationships of elements, such omission amounting to a gap between the necessary structural connections." *See* Final Office Action, page 2 (citing M.P.E.P. § 2172.01). The Examiner stated that she "is not able to determine how the extrusion feed zone related to any other part of the instant invention." *See* Final Office Action, page 2. However, Appellants respectfully assert that the Examiner's lack of understanding of the technology at issue is does not support an indefiniteness rejection. Appellants respectfully assert that subject matter recited in claim 3 is definite, and would be recognized as so by one of ordinary skill. The plain language of claim 3, especially in view of embodiments in the specification, is not insolubly ambiguous, clearly satisfying 35 U.S.C. § 112, second paragraph. *See, e.g.*, page 4, para. 9; pages 21-22; para. 56-57; Figure 3.

For example, the present specification explains that the extrusion feed zone (e.g., extruder feed tank) and purge zone (e.g., purge column) may be integrated to have a common purge gas system, where fresh purge gas may be fed to the extruder feed zone. *See* Specification, page 21, para. 56. As described by the specification, such a single purge gas system may accommodate the purge zone, transport of polymer, and the extrusion feed zone into a single system. *See id.* Appellants respectfully request that the Board to direct the Examiner withdraw the rejection of claim 3 under § 112, and to allow claim 3.

Claim 28

With regard to claim 28, the Examiner noted that claim 28 recites "a portion of liquid from the fractionation zone is transferred to the recycle zone." *See* Final Office Action, page 2. The Examiner found this language recited in claim 28 as contradictory with the base claim 25, which states that liquid from the recycle zone is transferred to the reaction zone "without fractionating." *See id.* The Examiner asked "how can fractioned liquid be sent to the recycle zone when the liquid from that zone is explicitly recited as not being fractionated?" *See id.*

Appellants respectfully assert that the Examiner misunderstands the recited process. Base claim 25 states that vapor from the recycle zone is transferred to a fractionation zone. This *vapor* is then processed in the fractionation zone to form a *liquid hydrocarbon*, such liquid which should not be confused with the liquid recited in claim 25 that is not sent to the fractionation zone. Dependent claim 28 is specifically directed to the transfer of the condensed liquid hydrocarbon *from* the fractionation zone, and *not* to any transfer of hydrocarbon liquid *to* the fractionation zone, as apparently thought by the Examiner. *See* Final Office Action, page 2. It is clear from the plain language of the claim 28, especially in view of the specification, that the liquid hydrocarbon recited in claim 28 may be transferred from the fractionation zone to a catalyst mud preparation zone and to the recycle zone (for recycle to the polymerization reactor). *See, e.g.*, Figure 1 and 2. The recitation of claim 28 is definite and satisfies § 112. In view of these

reasons, Appellants respectfully request that the Board direct the Examiner to withdraw the rejection of claim 28 under Section 112, and to allow claim 28.

Second, Fifth, and Sixth Grounds of Rejection – 35 U.S.C. § 103(a)

The Examiner rejected claims 1, 2, 5 and 9-14 under 35 U.S.C. 103(a) as being unpatentable over Hanson (5,597,892) in view of Kniel (3,696,162) and Howard et al. (5,533,437). In addition, the Examiner rejected claims 15-17, 20-22, 24 and 45 under 35 U.S.C. 103(a) as being unpatentable over Hanson in view of Kreischer et al., Howard et al., and Perry. Further, the Examiner rejected claims 25, 27, 29-36, 39, 41, 43, 46, 47 and 49-51 under 35 U.S.C. 103(a) as being unpatentable over Hanson in view of Kreischer et al., and Howard et al. Appellants respectfully traverse these rejections. Claims 1, 15, 25, 36, and 46 are independent.

Legal Precedent

The burden of establishing a *prima facie* case of obviousness falls on the Examiner. *Ex parte Wolters and Kuypers*, 214 U.S.P.Q. 735 (PTO Bd. App. 1979). To establish a *prima facie* case, the Examiner must show that the combination includes *all* of the claimed elements, and also a convincing line of reason as to why one of ordinary skill in the art would have found the claimed invention to have been obvious in light of the teachings of the references. *Ex parte Clapp*, 227 U.S.P.Q. 972 (B.P.A.I. 1985). Obviousness cannot be established by combining or modifying the teachings of the prior art to produce the claimed invention absent some teaching or suggestion supporting the

combination or modification. *See ACS Hospital Systems, Inc. v. Montefiore Hospital*, 732 F.2d 1572, 1577, 221 U.S.P.Q. 929, 933 (Fed. Cir. 1984).

Features of the Independent Claims Missing from the Cited Combinations

Independent claims 1 and 25 recite "transferring the mixed stream to a recovery zone where the purge gas and hydrocarbon fluid are separated to form a *recovered purge gas stream* and a recovered hydrocarbon fluid stream . . . [and] *passing at least a first portion of the recovered purge gas stream from the recovery zone to the purge zone*." The Examiner relied on the Howard reference to disclose these features, stating that the Howard product purge gas 23 is "sent to a separator (115) which separates the [product purge gas 23] into a purge gas portion and a hydrocarbon stream (27)." *See* Final Office Action, pages 3, 9, and 10. However, the compressed vapor 29 exiting the Howard separator 115 is <u>not</u> a recovered purge gas stream *See* Howard, col. 8, lines 16-33; Figure 1. Instead, this compressed vapor 29 is a mixture of purge gas and other components. *See* Howard, column 5, lines 50-59. Further this compressed vapor 29 is not sent to a purge zone, as claimed. Instead, vapor 29 is sent to a scrubber column 117. *See* Howard, column 5, lines 50-59; Figure 1. Moreover, all other references cited by the Examiner do nothing to obviate these deficiencies of Howard. Accordingly, independent claims 1 and 25, and their dependent claims, are believed to be patentable over the cited combinations.

Independent claims 15 and 36 recite "a hydrocarbon/purge gas recovery unit adapted to separate hydrocarbon fluid from purge gas, [wherein] the recovery unit is fluidically connected to a top portion of the purge column and adapted to receive a fluid stream comprising purge gas and hydrocarbon fluid from the purge column." The Examiner relied on the Howard reference to teach this feature. However, it is strikingly clear that while the Howard et al. references discloses a separator 107, it plainly does not teach a "purge column," as recited in the instant claims. Further, no recovery unit is fluidically connected to a top portion of a purge column. *See* Howard, Figure 1. Moreover, all other references cited by the Examiner do nothing to obviate these deficiencies of Howard. Accordingly, independent claims 15 and 36, and their dependent claims, are believed to be patentable over the cited combination.

In addition, claim 15 recites "a vapor delivery conduit coupled to a top portion of the recycle tank and fluidically connected to a first fractionation column." Similarly, independent claim 36 recites "a vapor delivery conduit fluidically connecting a top portion of the recycle tank with a first fractionation column." Apparently, the Examiner relied on Kreischer et al. in conjunction with Hanson to teach this features. *See* Final Office, page 6. However, Appellants respectfully emphasize that none of the references cited by the Examiner teach such a vapor delivery conduit. For example, Hanson merely teaches that vapor is removed from the accumulator 42, with no mention of a delivery conduit to a fractionation system, as acknowledged by the Examiner. *See* Final Office Action, page 9; Hanson, col. 3, lines 2-8 and Figure 1. In Kreischer et al., there is no recycle tank.

Instead, the vapor recovered via the flash system (vessels 14 and 30) is not condensed, precluding the need for a recycle tank. *See* Kreischer, Figure. Accordingly, for this additional reason, independent claims 15 and 36, and their dependent claims, are believed to be patentable over the cited combination.

Independent claim 25 recites "transferring vapor from the recycle zone to a fractionation zone." Similarly, independent claim 46 recites, "transporting an equilibrium vapor of the recovered hydrocarbon liquid to a fractionation system." Apparently, the Examiner relied on Kreischer et al. in conjunction with Hanson to teach this feature. *See* Final Office, page 9. However, Appellants respectfully emphasize that none of the references cited by the Examiner teach such a transfer of equilibrium vapor. For example, Hanson does *not* teach processing of vapor from the accumulator 42, as acknowledged by the Examiner. *See* Final Office Action, page 9; Hanson, col. 3, lines 2-8 and Figure 1. In Kreischer et al., the vapor recovered via the flash system (vessels 14 and 30) is not condensed, thereby precluding formation of a subsequent equilibrium vapor (for processing in a fractionation system, as claimed). *See* Kreischer, Figure. The cited references do *not* teach a recycle tank, having a liquid level where the equilibrium vapor is processed, as claimed. Accordingly, independent claims 25 and 46, and their dependent claims, are believed to be patentable over the cited combination.

Therefore, in sum, the cited references, taken alone or in combination, fail to teach, suggest, or disclose *all* of the features of the independent claims. Moreover, there

is no suggestion or motivation to modify or combine the cited references in the manner asserted by the Examiner or in the manner recited in the claims. Therefore, the independent claims 1, 15, 25, 36, and 46, and their dependent claims, are believed to be patentable over all cited combinations. Accordingly, Appellants respectfully request that the Board direct the Examiner to withdraw the foregoing rejections and allow the claims.

No Motivation to Combine Hanson and Kreischer

In formulating the combination of Hanson and Kreischer et al. to reject independent claims 15, 25, 36, and 46, the Examiner stated that it would have been obvious "to send the vapors [from the accumulator 42] of Hanson to a fractionating column, as taught by Kreischer, in order to recover heavy hydrocarbons from the produced vapors before they are released into the atmosphere." *See* Final Office Action, pages 6 and 9. First, Appellants respectfully note that it highly unlikely that such vapors would be released to the atmosphere.

Second, there is no suggestion or motivation to incorporate the Kreischer fractionation system in the Hanson process. After all, in Hanson, the vapor exiting the cyclone flash vessel 28 is condensed (via heat exchanger 38) to recycle monomer to the reactor 10 (via accumulator 42, pump 44, and conduits 16 and 18). *See* Hanson, col. 2, lines 60-67; col. 3, lines 2-8; Figure 1. The relatively high pressure of the Hanson condensation employed to condense and recycle monomer in a liquid stream (via conduits 16 and 18). *See* Hanson, col. 4, lines 9-13; Figure 1. Such a stream would

clearly contain the heavier components (i.e., heavier than the monomer), precluding the need for a fractionation system to recover heavy components from the vapor. *See id.*

Indeed, Appellants believe that the unnumbered vapor stream exiting the Hanson accumulator 42, which the Examiner improperly proposes to send to the Kreischer et al. fractionation system, would contain insignificant quantities of heavy components. It should be noted that the only other vapor stream exiting the Hanson recovery system does *not* exit from a recycle tank, but instead is vapor generated by the flash chamber 50. *See* Hanson, col. 3, lines 22-27; Figure 1. This vapor is compressed (via compressor 56) and condensed (via condenser 60) for recycle directly to the reactor 10 (via conduit 16). *See id.*

Moreover, Appellants respectfully emphasize that Kreischer system has no need for the Hanson accumulator 42. Indeed, the Kreischer et al. vapor is compressed for fractionation, without any reason of intermediate condensation prior to introduction of the compressed vapor to the Kreischer et al. fractionation system. *See* Kreischer, col. 3, line 23 – col. 4, line 15; Figure. In view of the foregoing, Appellants respectfully assert that the Examiner proposed combination of Hanson and Kreischer et al. is improper. Accordingly, Appellants respectfully request that the Board direct the Examiner to withdraw the rejections based on the combination of Hanson and Kreischer et al., and allow the affected claims.

No Motivation to Combine Hanson and Howard

In all rejections under § 103 in the Final Office Action, the Examiner inappropriately modified Hanson liquid slurry polymerization system to incorporate the Howard absorption system. *See* Final Office Action, pages 3 and 6-10. Appellants emphasize that one of ordinary skill in the art would not be motivated to combine the absorption system of Howard, which is designed for a *gas* phase polymerization reactor system, with the liquid polymerization system of Hanson. After all, the relative volume to solid ratio (of the recovered hydrocarbon to polymer), as well as the recycle conditions (e.g., reactor pressure) are radically different for effluent from a gas phase reactor versus a liquid phase reactor. Again, the Examiner inappropriately relied on such a modification of Hanson in all cited combinations. Accordingly, Appellants respectfully request that the Board direct the Examiner withdraw all cited combinations and allow all claims.

The Kniel Reference Is Non-Analogous Art

Additionally, as discussed below, Appellants request that the Board direct the Examiner to withdraw the Kniel reference because the reference is non-analogous art. The Examiner must present appropriate references to support his rejection. Specifically, the Examiner must present "analogous" prior art. *See* M.P.E.P. §2141.01(a). In order to rely on a reference as a basis for rejection of an applicant's invention, the reference must either: 1) be in the field of the applicant's endeavor or, if not, then; 2) be reasonably pertinent to the particular problem with which the inventor was concerned. *See In re Oetiker*, 977 F.2d 1443, 1446; 24 U.S.P.Q.2d 1443, 1445 (Fed. Cir. 1992). A reference is

reasonably pertinent if, even though it may be in a different field from that of the inventor's endeavor, it is one which, because of the matter with which deals, logically would have commended itself to an inventor's attention considering his problem. *Wang Laboratories, Inc. v. Toshiba Corp.*, 993 F.2d 858 26 U.S.P.Q.2d 1767 (Fed. Cir. 1993). Appellants respectfully assert the Kniel reference does not satisfy these threshold burdens.

The Kniel reference satisfies neither step of the two-part test described above and thus does not qualify as analogous art. In regard to the first step, even if Kniel discloses a "fractionator," as asserted by the Examiner, it would be in a completely different field of art (i.e., amine regeneration) from the Appellants' field of endeavor (i.e., slurry polymerization). It is clear that the field of the inventor's endeavor relates generally to a technique for slurry polymerization and the accompanying recovery of effluent. *See e.g.*, Application, pages 1-5. Turning to the cited reference, the mere inclusion of a "fractionator" from a system for amine regeneration does not render the incorrectly incorporated element "fractionator" within the field of the Appellants' endeavor, i.e., a field that encompasses recovery of effluent in a liquid slurry polymerization process. Therefore, the Kniel reference is not in the field of Appellants' endeavor.

In regard to the second step of the analogous art test, the problems associated with the processing of the slurry polymerization reactor effluent are completely different than that of any fractionation in an amine regeneration process. For example, the problems in the present application of recovering and separating hydrocarbon (e.g., diluent, monomer)

and purge gas (e.g., nitrogen) are in no way related to the problems in the Kniel reference of amine regeneration and diene carryover. *See, e.g.*, Kniel, Abstract. In relying on the Kniel reference, the Examiner is apparently incorrectly assuming that all hydrocarbons and all fractionation problems are analogous. *See* M.P.E.P. §2141.01(a) (citing *In re Oetiker*, 977 F.2d 1443 (Fed. Cir. 1992) (holding that a "hook" of a garment was not analogous art to a similar "hook" for a hose clamp, reasoning that not all hooking problems are analogous)).

There is simply no evidence whatsoever that similar problems exist in these strikingly different fields of art, much less any evidence to suggest that those skilled in the art of slurry polymerization would consult the art amine regeneration. Similarly, there is no evidence to suggest that those skilled in the art of amine regeneration would consult the art of slurry polymerization. Moreover, Kniel simply mentions a "fractionator" with no additional explanation. *See* Kniel, col. 3, lines 54-61. Further, as appreciated by those of ordinary skill in the art, the configuration and operating conditions which are disclosed in the Kniel system simply would not work (not properly perform the needed fractionation) in the monomer/diluent recovery system of the slurry polymerization process of the present invention. For example, the operating pressures disclosed in Kniel are much too low to effectively process the hydrocarbon of the present invention. *See* Kniel, col. 3, liens 50 – col. 4, line 16; Application, paras. 47-51. Again, this is not surprising because the problems addressed in Kniel are completely different than the problems addressed by the present invention. In sum, the Kniel reference is not

reasonably pertinent because the matter with which it deals would not have logically commended itself to the Appellants' attention in considering their problem, or to the attention of any one skilled in the art to which the invention pertains. Therefore, the Kniel reference has failed the second step of the analogous art test. Accordingly, the Kniel reference is believed to be non-analogous art with respect to the present application.

For these reasons, Appellants respectfully request that the Board direct the Examiner to remove of the Kniel reference from consideration. Accordingly, Appellants respectfully request that the Board direct the Examiner to withdraw the rejections under 35 U.S.C. §103(a) in which the Examiner relied on the Kniel reference, and allow of the claims.

<u>Remaining Grounds of Rejection – 35 U.S.C. § 103(a)</u>

The Examiner rejected claims 3 and 44 under 35 U.S.C. § 103(a) as being unpatentable over Hanson (5,597,892) in view of Kniel (3,696,162) and Howard et al. (5,533,437) and Howard et al. (5,533,437), and further in view of Perry (3,869,807); claims 6 and 7 under 35 U.S.C. § 103(a) as being unpatentable over Hanson (5,597,892) in view of Kniel (3,696,162) and Howard et al. (5,533,437) and Howard et al. (5,533,437), and further in view of Kreischer et al. (6,045,661); claims 28, 40 and 48

under 35 U.S.C. 103(a) as being unpatentable over Hanson (5,597,892) in view of Kreischer et al. (6,045,661), and Howard et al. (5,533,437), and Perry (3,869,807), as applied to claims 27, 39, and 46, and further in view of Kufeld et al. (6,559,247); claim 21 under 35 U.S.C. 103(a) as being unpatentable over Hanson (5,597,892) in view of Kreischer et al. (6,045,661), Howard et al. (5,533,437), and as applied to claim 15, and further in view of Kufeld et al. (6,559,247); and claim 8 under 35 U.S.C. 103(a) as being unpatentable over over Hanson (5,597,892) in view of Kniel (3,696,162) and Howard et al. (5,533,437) and Howard et al. (5,533,437), and Kreischer et al. (6,045,661), as applied to claim 7, further in view of Kufeld et al. (6,559,247).

All rejected claims under these remaining grounds of rejections are dependent claims. In rejecting the various dependent claims, the Examiner's cited combinations do not obviate the deficiencies of the references and combinations discussed above with regard to the independent claims. Therefore, all of the dependent claims are believed to be patentable by virtue of their dependency on their respective allowable base claims. Accordingly, Appellants respectfully request that the Board direct the Examiner to withdraw the rejections and allow the claims.

Conclusion

Appellants respectfully submit that all pending claims are in condition for allowance. However, if the Examiner or Board wishes to resolve any other issues by way of a telephone conference, the Examiner or Board is kindly invited to contact the undersigned attorney at the telephone number indicated below.

Respectfully submitted,

Date: August 21, 2006

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8. APPENDIX OF CLAIMS ON APPEAL

A listing of all claims and their current status in accordance with 37 C.F.R. § 1.121(c) is provided below.

1. (Previously Presented) A process for slurry polymerization and for separating hydrocarbon fluid from solid polymer particles and purge gas, said process comprising:

polymerizing in a reaction zone at least one olefin monomer to produce a slurry comprising solid polymer particles and hydrocarbon fluid;

withdrawing a portion of the slurry from the reaction zone;

separating at least a majority of the hydrocarbon fluid from the solid polymer particles in an intermediate pressure zone as a vaporized hydrocarbon fluid stream;

condensing the vaporized hydrocarbon fluid stream in a condensing zone, whereby a condensed hydrocarbon fluid stream is formed;

transferring the solid polymer particles from the intermediate pressure zone to a purge zone in which a purge gas is passed through the solid polymer particles to remove entrained hydrocarbon fluid, thereby forming a mixed stream containing hydrocarbon vapor and purge gas;

transferring the mixed stream to a recovery zone where the purge gas and hydrocarbon fluid are separated to form a recovered purge gas stream and a recovered hydrocarbon fluid stream;

passing at least a first portion of the recovered purge gas stream from the recovery zone to the purge zone;

passing at least a first portion of the recovered hydrocarbon fluid stream from the recovery zone to a fractionation zone;

transferring the condensed hydrocarbon fluid stream from the condensing zone to a recycle zone; and

transferring at least a majority of the condensed hydrocarbon fluid in the recycle zone to the reaction zone without fractionating the condensed hydrocarbon fluid.

2. (Previously Presented) The process of claim 1, comprising passing a second portion of the recovered purge gas stream from the recovery zone to a closed loop transfer zone.

3. (Previously Presented) The process of claim 1, comprising feeding fresh purge gas to an extrusion feed zone and refraining from feeding fresh purge gas to the purge zone.

4. (Cancelled).

5. (Previously Presented) The process of claim 1, comprising passing a second portion of the recovered hydrocarbon fluid stream from the recovery zone to the recycle zone.

6. (Previously Presented) The process of claim 1, further comprising transferring vapor from the recycle zone to the fractionation zone.

7. (Previously Presented) The process of claim 6, comprising transferring substantially no liquid from the recycle zone to the fractionation zone.

8. (Previously Presented) The process of claim 7, comprising transferring liquid hydrocarbon from the fractionation zone to a catalyst preparation zone.

9. (Original) The process of claim 1, wherein the recovered purge gas stream from the recovery zone is not flared.

10. (Original) The process of claim l, wherein the recovered purge gas stream exiting the recovery zone contains less than 5000 ppm of hydrocarbon.

11. (Original) The process of claim 1, wherein the recovered purge gas stream exiting the recovery zone contains less than 1000 ppm of hydrocarbon.

12. (Original) The process of claim 1, wherein the recovered purge gas stream exiting the recovery zone contains less than 500 ppm of hydrocarbon.

13. (Original) The process of claim 1, wherein the recovered purge gas stream exiting the recovery zone is essentially free of hydrocarbon.

14. (Original) The process of claim 1, wherein the purge gas is nitrogen and the hydrocarbon fluid comprises a diluent.

15. (Previously Presented) An apparatus for slurry polymerization in a hydrocarbon fluid and for separating hydrocarbon fluid from solid polymer particles and purge gas, the apparatus comprising:

(a) a polymerization reactor in which one or more olefins are polymerized to form solid polymer particles in a hydrocarbon fluid;

(b) an intermediate pressure chamber adapted for the separation of hydrocarbon fluid from the solid polymer particles, the chamber having an inlet for receiving hydrocarbon fluid and solid polymer particles from the polymerization reactor, a polymer outlet for discharging solid polymer particles, and a gas outlet for discharging vaporized hydrocarbon fluid;

(c) a condenser fluidically connected to the gas outlet of the intermediate pressure chamber and adapted to condense the vaporized hydrocarbon fluid by heat exchange and without compression;

(d) a purge column fluidically connected to the polymer outlet of the intermediate pressure chamber, the purge column adapted to receive the solid polymer particles from the intermediate pressure chamber;

(e) a hydrocarbon/purge gas recovery unit adapted to separate hydrocarbon fluid from purge gas, the recovery unit fluidically connected to a top portion of the purge column and adapted to receive a fluid stream comprising purge gas and hydrocarbon fluid from the purge column;

(f) a recycle tank adapted to receive condensed hydrocarbon vapor from the condenser;

(g) a pump and at least one conduit fluidically connected to a bottom portion of the recycle tank, wherein the pump and the at least one conduit are adapted to transport the condensed hydrocarbon fluid from the recycle tank to the reactor without transporting the condensed hydrocarbon fluid through a fractionation system;

(h) a vapor delivery conduit coupled to a top portion of the recycle tank and fluidically connected to a first fractionation column; and

(i) an extruder feed tank adapted to receive the solid polymer particles from the purge column.

16. (Previously presented) The apparatus of claim 15, comprising a fresh purge gas feed connected to the extruder feed tank.

17. (Original) The apparatus of claim 15, wherein the recycle tank is also fluidly connected to receive a second hydrocarbon fluid stream from the hydrocarbon/purge gas recovery unit.

18. (Cancelled).

19. (Cancelled).

20. (Previously Presented) The apparatus of claim 15, wherein the first fractionation column does not have a sidedraw.

21. (Previously Presented) The apparatus of claim 22, comprising a liquid delivery conduit from the second fractionation column to a catalyst preparation tank.

22. (Original) The apparatus of claim 20, further comprising a second fractionation column adapted to receive a top product from the first fractionation column.

23. (Cancelled).

24. (Original) The apparatus of claim 15, wherein the recovery unit is not connected to a purge gas flare.

25. (Previously Presented) A process for slurry polymerization and for separating hydrocarbon fluid from solid polymer particles and purge gas, said process comprising:

polymerizing in a reaction zone at least one olefin monomer to produce a slurry, comprising solid polymer particles and hydrocarbon fluid;

withdrawing a portion of the slurry from the reaction zone;

separating at least a majority of the hydrocarbon fluid from the solid polymer particles in an intermediate pressure zone as a vaporized hydrocarbon fluid stream;

condensing the vaporized hydrocarbon fluid stream in a condensing zone, whereby a condensed hydrocarbon fluid stream is formed;

transferring the condensed hydrocarbon fluid stream from the condensing zone to a recycle zone;

transferring the solid polymer particles from the intermediate pressure zone to a purge zone in which a purge gas is passed through the solid polymer particles to remove entrained hydrocarbon fluid, thereby forming a mixed stream containing hydrocarbon vapor and purge gas;

transferring the mixed stream to a recovery zone where the purge gas and hydrocarbon fluid are separated to form a recovered purge gas stream and a recovered hydrocarbon fluid stream;

passing at least a portion of the recovered purge gas stream from the recovery zone to the purge zone;

passing at least a portion of the recovered hydrocarbon fluid stream from the recovery zone to the recycle zone;

transferring vapor from the recycle zone to a fractionation zone; and

transferring hydrocarbon liquid from the recycle zone to the reaction zone without fractionating the hydrocarbon liquid.

26. (Cancelled).

27. (Previously Presented) The process of claim 25, comprising transferring substantially no liquid from the recycle zone to the fractionation zone.

28. (Original) The process of claim 27, further comprising transferring a minor portion of liquid hydrocarbon from the fractionation zone to a catalyst mud preparation zone, and transferring a major potion of the liquid hydrocarbon from the fractionation zone to the recycle zone.

29. (Original) The process of claim 25, wherein the recovered purge gas stream from the recovery zone is not flared.

30. (Original) The process of claim 25, wherein the recovered purge gas stream exiting the recovery zone contains less than 5000 ppm of hydrocarbon.

31. (Original) The process of claim 25, wherein the recovered purge gas stream exiting the recovery zone contains less than 1000 ppm of hydrocarbon.

32. (Original) The process of claim 25, wherein the recovered purge gas stream exiting the recovery zone contains less than 500 ppm of hydrocarbon.

33. (Original) The process of claim 25, wherein the recovered purge gas stream exiting the recovery zone is essentially free of hydrocarbon.

34. (Original) The process of claim 25, wherein the purge gas is nitrogen and the hydrocarbon fluid comprises a diluent.

35. (Original) The process of claim 25, wherein the recovered purge gas stream is at least partially used for providing a motive force to solid polymer particles which have already passed through the purge zone.

36. (Previously Presented) An apparatus for slurry polymerization in a hydrocarbon fluid and for separating hydrocarbon fluid from solid polymer particles and purge gas, the apparatus comprising:

(a) a polymerization reactor in which one or more olefins are polymerized to form solid polymer particles in a hydrocarbon fluid;

(b) an intermediate pressure chamber adapted to separate hydrocarbon fluid from the solid polymer particles, the chamber having an inlet for receiving hydrocarbon fluid and solid polymer particles from the

polymerization reactor, a polymer outlet for discharging solid polymer particles, and a gas outlet for discharging vaporized hydrocarbon fluid;

(c) a condenser fluidly connected to the gas outlet of the intermediate pressure chamber, the condenser adapted to condense the vaporized hydrocarbon fluid by heat exchange and without compression;

(d) a purge column fluidly connected to the polymer outlet of the intermediate pressure chamber and adapted to receive the solid polymer particles from the intermediate pressure chamber;

(e) a hydrocarbon/purge gas recovery unit adapted to separate hydrocarbon fluid from purge gas, wherein the recovery unit is fluidically connected to a top portion of the purge column and adapted to receive a fluid stream comprising purge gas and hydrocarbon fluid from the purge column;

(f) a recycle tank adapted to receive hydrocarbon liquid from the condenser to receive hydrocarbon fluid from the hydrocarbon/purge gas recovery unit;

(g) a liquid delivery conduit fluidically connecting a bottom portion of the recycle tank with the polymerization reactor, wherein the fluidic connection between the recycle tank and the reactor does not include a fractionation column; and

(h) a vapor delivery conduit fluidically connecting a top portion of the recycle tank with a first fractionation column.

37. (Cancelled).

38. (Cancelled).

39. (Previously Presented) The apparatus of claim 36, further comprising a second fractionation column adapted to receive a top product from the first fractionation column.

40. (Original) The apparatus of claim 39, further comprising a liquid delivery conduit from the second fractionation column to a catalyst preparation tank.

41. (Original) The apparatus of claim 39, wherein the first and second fractionation columns do not have sidedraws.

42. (Cancelled).

43. (Original) The apparatus of claim 36, wherein the recovery unit is not connected to a purge gas flare.

44. (Previously Presented) The process of claim 1, comprising passing a second portion of the recovered purge gas stream from the recovery zone to an extrusion feed zone.

45. (Previously Presented) The apparatus of claim 15, wherein the extruder feed tank is configured to receive a portion of the purge gas stream exiting the recovery unit.

46. (Previously Presented) A method of processing effluent of a polymerization reactor, the effluent comprising hydrocarbon liquid and polymer solids, the method comprising:

separating a majority of the hydrocarbon liquid from the polymer solids in the effluent by flashing the majority of the hydrocarbon liquid to generate a hydrocarbon vapor;

transporting and condensing the hydrocarbon vapor to form a recovered hydrocarbon liquid;

transporting an equilibrium vapor of the recovered hydrocarbon liquid to a fractionation system; and

recycling at least a portion of the recovered hydrocarbon liquid to the polymerization reactor without fractionating the recovered hydrocarbon liquid.

47. (Previously Presented) The method of claim 46, wherein recycling comprises transporting the recovered hydrocarbon liquid to a recycle tank and pumping the recovered hydrocarbon liquid from the recycle tank to the polymerization reactor.

48. (Previously Presented) The method of claim 46, comprising processing the equilibrium vapor in the fractionation system to generate a diluent substantially free of olefin for use in catalyst preparation and delivery.

49. (Previously Presented) The method of claim 46, comprising purging the polymer solids with a purge gas to remove residual hydrocarbon entrained in the polymer solids to form a first stream comprising the purge gas and the residual hydrocarbon.

50. (Previously Presented) The method of claim 49, comprising separating purge gas from the first stream to form a second stream comprising separated purge gas and a third stream comprising primarily hydrocarbon.

51. (Previously Presented) The method of claim 50, comprising transporting the second stream to the recycle tank or to the fractionation system, or a combination thereof.

9. **APPENDIX OF EVIDENCE**

None.

10. APPENDIX OF RELATED PROCEEDINGS

None.